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Relationships between Abnormal Findings during Medical Examinations and Subsequent Diagnoses of Significant Conditions, Active Components, U.S. Armed Forces, January 1998-October 2006

Military service is physically and psychologically demanding. Examinations of applicants for military service are routinely conducted to identify conditions that may preclude the full and safe performance of required military duties. Because military members are generally healthy when they enter service, military medical departments emphasize the prevention of illnesses and injuries, the promotion of health and fitness, and the enhancement of military operational capabilities during service ("force health protection and readiness").[1] A major part of these illness and injury prevention/health promotion efforts includes medical examinations (e.g., routine periodic, pre/post deployment, occupational). During 2005, approximately 2.8 million medical examinations of active component military members (more than one-fifth of all outpatient encounters) were conducted and reported on standardized medical records.[2,3]

The December 2006 issue of the *MSMR* included a summary of numbers and rates of abnormal findings that were temporally associated with the conduct of routine medical examinations.[2] However, in generally healthy young adult populations such as the U.S. military, abnormal findings on routine examinations are often not indicative of significant, treatable underlying medical conditions (and may, in fact, be harmful).[4,5] This report includes a summary of the numbers, rates, and distributions of confirmed diagnoses of selected significant medical conditions following "indicator" abnormal findings associated with routine medical examinations.

Methods: The surveillance period was 1 January 1998 to 31 October 2006. The surveillance population included all individuals who served in an active component of the U.S. Armed Forces any time during the surveillance period. For this report, we identified all military members who had one or more of the following abnormal findings reported as a diagnosis during a medical encounter within 30 days of a routine medical examination (as indicated by a "V code" in the ICD-9-CM): "elevated blood pressure"; "nonspecific abnormal Papanicolaou smear of the cervix"; "breast lump"; "cardiac murmur"; "blood in stool"; "enlarged lymph nodes"; "abnormal glucose tolerance"; "wheezing"; "elevated prostate specific antigen (PSA)"; "retinopathy/retinal vascular abnormality"; "neoplasm, testis." (Details of the method, including relevant ICD-9-CM codes, were reported in the December 2006 issue of the MSMR).

For each abnormal finding associated with a medical examination, we identified the first subsequent medical encounter of the same individual during which a related significant medical condition (selected) was diagnosed. For example, among individuals with a finding of "breast lump," subsequent diagnoses of "malignant neoplasm" or "carcinoma *in situ*" of the breast were identified. The indicator findings and associated medical conditions of interest for this analysis are shown in Table 1, pages 3-5.

To increase the likelihood that reports of medical conditions were true diagnoses (rather than "rule outs" or miscodes, for example), we defined "confirmed diagnoses" as conditions that were diagnosed during three or more medical encounters with at least seven days between encounters. Frequencies and cumulative incidence rates of confirmed diagnoses of conditions of interest were calculated among all and in subgroups of military members with related abnormal findings.

Results: Of the eleven abnormal findings of interest during this analysis, those with the highest rates of confirmed diagnoses of related conditions were "neoplasm of the testis" (18.6% with "malignant neoplasm of the testis"), "elevated PSA" (13.7% with "malignant neoplasm of the prostate"), "wheezing" (13.0% with "asthma"), and "elevated blood pressure" (10.3% with "hypertensive disease") (Table 1).

In contrast, 0.3% of those with "abnormal Papanicolaou smear of the cervix" had subsequent confirmed diagnoses of "malignant neoplasm" or "carcinoma *in situ*" of the cervix; 0.4% of those with "blood in stool" had subsequent confirmed diagnoses of "malignant neoplasm" or "carcinoma *in situ*" of the colon, rectum, rectosigmoid, or anus; 1.5% of those with "breast lump" had subsequent confirmed diagnoses of "malignant neoplasm" or "carcinoma *in situ*" of the breast; and 1.9% of those with "enlarged lymph nodes" had subsequent confirmed diagnoses of "malignant neoplasm" of lymphatic or hematopoietic tissue (Table 1).

Among those with abnormal findings, rates of confirmed diagnoses of related significant medical conditions generally increased or were stable with age.

Table 1. Relationships between abnormal findings on medical examinations and related medical conditions, active components, U.S. Armed Forces, January 1998-October 2006

	Elevated blood pressure			Nonspecific abnormal Papanicolaou smear of cervix					Breast lump					Cardiac murmur						
		Hypertensive disease			Malignant neoplasm, cervix		Carcinoma in situ, cervix			Malignant neoplasm, female breast		Carcinoma in situ, breast			Other endocardium (e.g., valve disorder)		Cardiac anomaly, incl septal closure		Other congenital anomaly, heart	
	Number with finding	Number with disease	Percent with disease	Number with finding	Number with disease	Percent with disease	Number with disease	Percent with disease	Number with finding	Number with disease	Percent with disease	Number with disease	Percent with disease	Number with finding	Number with disease	Percent with disease	Number with disease	Percent with disease	Number with disease	Percent with disease
Service																				
Army	14,694	1,393	9.48	10,237	5	0.05	20	0.20	5,255	80	1.52	7	0.13	4,543	50	1.10	8	0.18	8	0.18
Navy	8,616	918	10.65	12,208	5	0.04	24	0.20	3,678	42	1.14	12	0.33	4,885	31	0.63	6	0.12	6	0.12
Air Force	16,168	1,838	11.37	10,111	6	0.06	26	0.26	5,170	61	1.18	9	0.17	3,185	42	1.32	6	0.19	6	0.19
Marine Corps	1,570	84	5.35	2,021	0	0.00	5	0.25	694	6	0.86	1	0.14	2,001	3	0.15	4	0.20	4	0.20
Gender																				
Male	35,204	3,552	10.09	na	na	na	na	na	na	na	na	na	na	9,703	99	1.02	12	0.12	12	0.12
Female	5,844	681	11.65	34,474	16	0.05	75	0.22	13,399	186	1.39	29	0.22	4,911	27	0.55	12	0.24	12	0.24
Age group																				
<20	1,395	43	3.08	7,378	0	0.00	9	0.12	1,181	0	0.00	0	0.00	3,551	5	0.14	4	0.11	4	0.11
20-24	8,543	378	4.42	16,508	1	0.01	34	0.21	4,238	4	0.09	0	0.00	4,177	19	0.45	9	0.22	9	0.22
25-29	7,782	546	7.02	5,751	3	0.05	15	0.26	2,884	7	0.24	2	0.07	2,135	17	0.80	4	0.19	4	0.19
30-39	14,244	1,976	13.87	3,765	8	0.21	14	0.37	4,201	76	1.81	8	0.19	2,872	50	1.74	3	0.10	3	0.10
40-49	8,191	1,182	14.43	1,094	4	0.37	3	0.27	2,097	91	4.34	16	0.76	1,637	28	1.71	4	0.24	4	0.24
50+	893	108	12.09	81	0	0.00	0	0.00	196	11	5.61	3	1.53	242	7	2.89	0	0.00	0	0.00
Race ethnicity																				
Black nonhisp	10,571	1,603	15.16	9,315	7	0.08	16	0.17	5,019	81	1.61	10	0.20	4,364	26	0.60	5	0.11	5	0.11
Hispanic/other	6,337	571	9.01	7,613	3	0.04	14	0.18	2,534	20	0.79	2	0.08	2,505	13	0.52	4	0.16	4	0.16
White nonhisp	24,140	2,059	8.53	17,649	6	0.03	45	0.25	7,244	88	1.21	17	0.23	7,745	87	1.12	15	0.19	15	0.19
Status																				
Officer	6,985	732	10.48	3,094	5	0.16	8	0.26	2,828	75	2.65	13	0.46	1,919	36	1.88	1	0.05	1	0.05
Enlisted	34,063	3,501	10.28	31,483	11	0.03	67	0.21	11,969	114	0.95	16	0.13	12,695	90	0.71	23	0.18	23	0.18
Occupation																				
Combat	6,266	513	8.19	2,595	2	0.08	9	0.35	994	12	1.21	1	0.10	1,734	31	1.79	2	0.12	2	0.12
Medical	4,467	460	10.30	5,508	4	0.07	7	0.13	3,217	53	1.65	10	0.31	1,709	11	0.64	4	0.23	4	0.23
Other	30,315	3,260	10.75	26,474	10	0.04	59	0.22	10,586	124	1.17	18	0.17	11,171	84	0.75	18	0.16	18	0.16
Total	41,048	4,233	10.31	34,577	16	0.05	75	0.22	14,797	189	1.28	29	0.20	14,614	126	0.86	24	0.16	24	0.16

Shaded cells indicate demographic/military subgroups with the highest prevalences of disease among those with associated findings.

Table 1 Continued. Relationships between abnormal findings on medical examinations and related medical conditions, active components, U.S. Armed Forces, January 1998-October 2006

	Blood in stool							Enlarged lymph nodes					Abnormal glucose tolerance			Wheezing			Elevated PSA		
		Malignant neoplasm, colon		Malignant neoplasm rectum, anus		Ulcerative colitis			Malignant neoplasm, lymphatic / hematopoietic		HIV infection			Diabetes mellitus			Asthma			Malignant neoplasm, prostate	
	Number with finding	Number with disease	Percent with disease	Number with disease	Percent with disease	Number with disease	Percent with disease	Number with finding	Number with disease	Percent with disease	Number with disease	Percent with disease	Number with finding	Number with disease	Percent with disease	Number with finding	Number with disease	Percent with disease	Number with finding	Number with disease	Percent with disease
Service																					
Army	4,430	10	0.23	6	0.14	75	1.69	3,831	62	1.62	11	0.29	1,465	97	6.62	1,581	211	13.35	860	126	14.65
Navy	2,834	9	0.32	7	0.25	36	1.27	1,435	34	2.37	8	0.56	1,494	134	8.97	583	68	11.66	411	60	14.60
Air Force	2,502	7	0.28	6	0.24	38	1.52	2,139	42	1.96	5	0.23	833	73	8.76	959	150	15.64	556	65	11.69
Marine Corps	640	0	0.00	1	0.16	8	1.25	603	12	1.99	1	0.17	159	11	6.92	292	16	5.48	82	11	13.41
Gender																					
Male	8,274	23	0.28	17	0.21	123	1.49	5,200	120	2.31	22	0.42	3,269	262	8.01	2,406	283	11.76	1,903	262	13.77
Female	2,132	3	0.14	3	0.14	34	1.59	2,808	30	1.07	3	0.11	682	53	7.77	1,009	162	16.06	na	na	na
Age group																					
<20	471	0	0.00	0	0.00	4	0.85	737	5	0.68	1	0.14	54	0	0.00	502	40	7.97	4	0	0.00
20-24	2,098	1	0.05	1	0.05	39	1.86	2,885	40	1.39	7	0.24	336	17	5.06	1,152	142	12.33	17	0	0.00
25-29	1,535	2	0.13	1	0.07	44	2.87	1,664	29	1.74	4	0.24	471	28	5.94	615	97	15.77	19	0	0.00
30-39	2,831	9	0.32	5	0.18	46	1.62	1,840	46	2.50	8	0.43	1,341	135	10.07	740	119	16.08	210	11	5.24
40-49	2,898	13	0.45	13	0.45	22	0.76	808	23	2.85	5	0.62	1,431	111	7.76	352	45	12.78	1,151	163	14.16
50+	573	1	0.17	0	0.00	2	0.35	74	7	9.46	0	0.00	318	24	7.55	54	2	3.70	508	88	17.32
Race ethnicity																					
Black nonhisp	2,089	3	0.14	4	0.19	29	1.39	2,101	32	1.52	12	0.57	983	99	10.07	750	139	18.53	449	76	16.93
Hispanic/other	1,875	4	0.21	4	0.21	18	0.96	1,195	23	1.92	2	0.17	915	75	8.20	641	69	10.76	273	27	9.89
White nonhisp	6,442	19	0.29	12	0.19	110	1.71	4,712	95	2.02	11	0.23	2,053	141	6.87	2,024	237	11.71	1,187	159	13.40
Status																					
Officer	2,466	8	0.32	4	0.16	34	1.38	1,107	33	2.98	4	0.36	806	38	4.71	343	45	13.12	978	162	16.56
Enlisted	7,940	18	0.23	16	0.20	123	1.55	6,901	117	1.70	21	0.30	3,145	277	8.81	3,072	400	13.02	931	100	10.74
Occupation																					
Combat	1,860	3	0.16	3	0.16	35	1.88	1,322	34	2.57	4	0.30	514	28	5.45	483	62	12.84	439	64	14.58
Medical	1,238	4	0.32	3	0.24	21	1.70	1,065	22	2.07	3	0.28	558	40	7.17	422	55	13.03	265	39	14.72
Other	7,308	19	0.26	14	0.19	101	1.38	5,621	94	1.67	18	0.32	2,879	247	8.58	2,510	328	13.07	1,205	159	13.20
Total	10,406	26	0.25	20	0.19	157	1.51	8,008	150	1.87	25	0.31	3,951	315	7.97	3,415	445	13.03	1,909	262	13.72

Shaded cells indicate demographic/military subgroups with the highest prevalences of disease among those with associated findings.

Table 1 Continued. Relationships between abnormal findings on medical exams and related conditions, January 1998-October 2006

	Retinopathy/retinal vascular			Neoplasm, testis		
	Diabetes mellitus			Malignant neoplasm, testis		
	Number with finding	Number with disease	Percent with disease	Number with finding	Number with disease	Percent with disease
Service						
Army	358	14	3.91	74	18	24.32
Navy	193	16	8.29	40	5	12.50
Air Force	426	15	3.52	83	13	15.66
Marine Corps	79	0	0.00	24	5	20.83
Gender						
Male	894	38	4.25	221	41	18.55
Female	162	7	4.32	na	na	na
Age group						
<20	54	0	0.00	12	1	8.33
20-24	153	1	0.65	54	13	24.07
25-29	113	1	0.88	49	12	24.49
30-39	309	9	2.91	77	12	15.58
40-49	356	25	7.02	29	3	10.34
50+	71	9	12.68	0	0	0.00
Race ethnicity						
Black nonhisp	271	14	5.17	31	1	3.23
Hispanic/other	174	9	5.17	37	7	18.92
White nonhisp	611	22	3.60	153	33	21.57
Status						
Officer	248	10	4.03	51	11	21.57
Enlisted	808	35	4.33	170	30	17.65
Occupation						
Combat	180	3	1.67	48	14	29.17
Medical	118	8	6.78	27	6	22.22
Other	758	34	4.49	146	21	14.38
Total	1,056	45	4.26	221	41	18.55

Shaded cells indicate demographic/military subgroups with the highest prevalences of disease among those with associated findings.

Notable exceptions were the relationships between "blood in stool" and "ulcerative colitis" (declining rates over age 30 years) and "wheezing" and "asthma" (sharply declining rates over age 40 years) (Table 1).

Compared to their counterparts, Black non-Hispanic members were much more likely to have confirmed diagnoses of "hypertensive disease" and "asthma" following findings of "elevated blood pressure" and "wheezing," respectively (Table 1).

Finally, there was not a consistent relationship between Service and rates of confirmed diagnoses after related abnormal findings (Table 1).

Data summaries by Stephen B. Taubman, PhD, Army Medical Surveillance Activity

Editorial comment: This summary suggests that most abnormal findings during medical examinations of generally healthy, physically active U.S. military members are not indicative of severe underlying medical illnesses. For example, in this analysis, blood in stool and abnormal Papanicolaou smears of the cervix were associated with malignant neoplasms in fewer than one of 200 cases overall (and much less often in service members younger than 30). On the other hand, more than one of ten service members who had testicular masses or elevated PSAs documented during/shortly after routine medical examinations had malignant neoplasms of the testis (particularly those in their twenties) or prostate (particularly those older than 40), respectively.

The results reported here must be interpreted with caution. For example, for the final analysis, we used only confirmed diagnoses of selected medical conditions. Because most of the medical conditions that we used as endpoints are severe (e.g., malignant neoplasms) and/or chronic (e.g., hypertensive disease), we felt that our definition of "confirmed diagnoses" would correctly classify most "true cases" and eliminate most cases that were evaluated and eventually "ruled out" or miscoded. Still, our strict definition may have eliminated some true cases (causing underestimation of the positive predictive values of some abnormal findings). In addition, some significant medical conditions that we did not include as endpoints may have been diagnosed subsequent to the abnormal findings that we considered for this report. The result would be underestimation of the prevalence of significant medical conditions among those with abnormal findings on medical examinations.

Also, results of some medical examinations (including abnormal findings) may not have been reported through standardized electronic data systems and, in turn, not included in the Defense Medical Surveillance System (which was the source of data for the analysis). As a result, some severe medical conditions that were diagnosed subsequent to abnormal findings during medical examinations would not have been considered as such in this analysis.

Given the shortcomings, the results are still informative and potentially useful. For example, care providers may reference them when interpreting the results of routine examinations of active military patients — particularly regarding the likely meanings of abnormal findings that may indicate severe underlying diseases.

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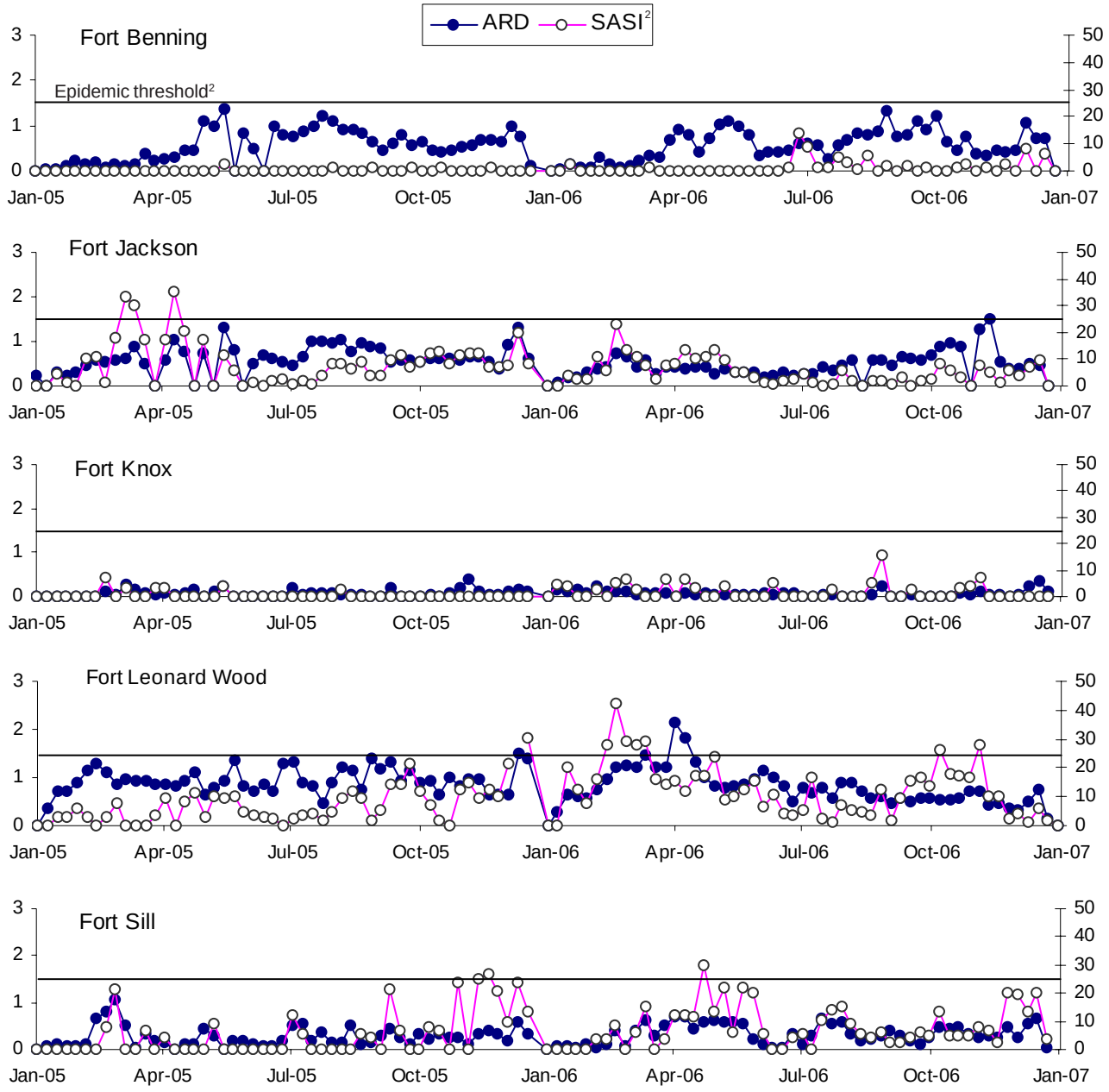
Acute respiratory disease (ARD) and streptococcal pharyngitis (SASI), Army basic training centers, by week through December 30, 2006



[1] ARD rate = cases per 100 trainees per week
[2] SASI (Strep ARD surveillance index) = (ARD rate)x(rate of Group A beta-hemolytic strep)
[3] ARD rate >=1.5 or SASI>=25.0 for 2 consectutive weeks indicates an "epidemic"

Epidemiologic Consultation (EPICON): Outbreak of Invasive Group A Streptococcal Infections among Trainees, Fort Leonard Wood, Missouri, 2006

Military trainee populations have historically been at high risk for outbreaks of acute respiratory disease (ARD).[1,2] Since the 1980s, there have been numerous outbreaks of diseases (including pharyngitis, tonsillitis, peritonsillar abscess, pneumonia, necrotizing fasciitis, streptococcal toxic shock, acute rheumatic fever) secondary to group A beta-hemolytic streptococcal (GABHS) infections.[1] The trainee population at Fort Leonard Wood (FLW), Missouri, has been particularly susceptible to such outbreaks.[1] Since 1994, basic combat trainees at Fort Leonard Wood who are not allergic to penicillin have been given an injection of long-acting benzathine penicillin (BPG) routinely during their medical in-processing to prevent outbreaks of GABHS-related diseases.

In 2005, King Pharmaceuticals, Inc., became the sole U.S. manufacturer of BPG (trade name: Bicillin®). Difficulties with the production facility resulted in supply interruptions that became especially severe in late summer 2006. Between July and September 2006, FLW was allocated only 20% of the BPG required for routine prophylaxis of incoming trainees.

Two trainees at FLW were hospitalized with necrotizing fasciitis due to GABHS in September and October 2006. The first case required amputation of the affected trainee's hand. The second case required multiple fasciotomies and debridement of all extremities. Both trainees were assigned to the same battalion. Routine surveillance did not reveal significant increases in the ARD rate or the Strep-ARD Surveillance Index (SASI) prior to the cases (see figure on page 6).

In response to the cases of necrotizing fasciitis, General Leonard Wood Army Community Hospital (GLWACH) personnel gave BPG to all non-allergic members of the affected battalion ("mass prophylaxis"), initiated environmental assessments of barracks, and briefed line commanders and medical providers regarding the nature of the threat, the current situation, and intervention measures. In addition, epidemiologic support was requested through the Great Plains Regional Medical Command (GPRMC).

The objectives of the epidemiologic consultation (EPICON) were to characterize the nature, timing, and distribution of severe GABHS infections among trainees; identify and characterize potential risk factors; assist in assessing indoor environments; and recommend outbreak control, infection prevention, active surveillance, infectious disease clinical management, and environmental practices to improve and protect the health of trainees at FLW. This report summarizes significant clinical and laboratory findings and recommendations of the investigation team.

Activities: The EPICON team deployed to FLW on 22 October 2006. While at FLW, they searched inpatient, outpatient, and laboratory records to identify all cases of invasive GABHS (using relevant ICD-9-CM codes) that occurred during 2005 and 2006 (to date). In addition, they conducted comprehensive environmental assessments (including sanitation inspections of barracks, common areas, and field training sites), performed indoor air quality testing, reviewed HVAC maintenance procedures, evaluated barracks isolation practices for ARD cases, and conducted environmental surface sampling for GABHS. Also, they conducted site visits and interviews with key personnel at FLW, the Missouri State Health Department, and the University of Missouri-Columbia Medical Center.

Of note, the EPICON team sent 12 GABHS isolates to the CDC (two from the necrotizing fasciitis cases, five from others in the same battalion, and five from other training units) and 27 isolates to the Navy Health Research Center (NHRC) laboratory in San Diego, California (two from the necrotizing fasciitis cases, 12 from others in the same battalion, two with mucoid colony morphology, two from Marine Corps units, and nine from other training units) for M-typing.

Methods: Confirmed cases of invasive streptococcal disease were defined as those infections that were clinically consistent with GABHS and confirmed with a positive GABHS culture obtained from the site of infection. Probable cases were defined as those infections that were clinically consistent with GABHS and lacked culture confirmation from the site of infection, but where GABHS was isolated from another site (e.g., throat culture) and/or where GABHS is known to be the infectious agent in the

majority of cases (e.g., peritonsillar abscesses).

Results: At Fort Leonard Wood, there were more than twice as many hospitalized invasive GABHS cases in 2006 (n=38, through November) than in 2005 (n=17). The rate of invasive GABHS at Fort Leonard Wood increased 2.2-fold from 2005 (0.7 cases per 1,000) to 2006 (1.6 cases per 1,000). A slightly higher proportion of 2006 (71%) than 2005 (59%) cases was confirmed.

In both 2005 and 2006, the most frequent clinical expressions of invasive GABHS were peritonsillar abscess (2005: n=10, 59%; 2006: n=15, 39%) and pneumonia (2005: n=6, 35%; 2006: 12, 32%). In 2006 in contrast to 2005, there were also cases of necrotizing fasciitis (n=4, 11%) and streptococcal toxic shock syndrome (n=2, 5%) (Table 1).

In 2005, cases of invasive GABHS per month ranged from 0 to four, and there were no clear trends (Figure 1). In 2006 (through November), cases per month ranged from one to nine, and cases increased by 3 per month from July (n=3) through September (n=9) (Figure 1). Routine prophylaxis with BPG was discontinued (due to supply shortages) in late July 2006. No trainees with invasive GABHS disease in 2006 received BPG prophylaxis within 4 weeks of the onsets of their illnesses.

More than one-third (n=14, 37%) of all confirmed and probable invasive cases in 2006 (including both necrotizing fasciitis cases) were from one battalion. No other battalion-sized unit at FLW had more than 5 invasive GABHS cases during the period.

Throat cultures of trainees with ARD revealed that recovery rates were higher when BPG was not available. The highest weekly GABHS recovery rate (47.8%) from ARD cases during 2005-2006 was in October 2006 (Figure 2). During most weeks in 2006, GABHS recovery rates – but not ARD rates (data not shown) –were higher than in corresponding weeks in 2005 (Figure 2).

In general, the GABHS recovery rate was significantly higher among male than female ARD cases; no other demographic factors (race, education level, home of record) were associated with GABHS infection. Not surprisingly, the battalion with the most invasive GABHS cases during the period also had the highest GABHS recovery rate among ARD cases (35.9 per 100 cultures). Barracks type was not significantly associated with GABHS-positive throat cultures among ARD cases.

Among the 12 GABHS isolates sent to the CDC for M-typing, a single virulent strain, M5.14, was identified. Of the 27 GABHS isolates sent to the NHRC laboratory, 20 (74%) were M5.14 (M18, M77, and M101 were also identified). Most of the isolates from invasive GABHS cases did not have mucoid colony morphology.

In summary, the rate of invasive GABHS disease at FLW in 2006 was approximately 50% higher than in 2005. In addition, prevalences of GABHS infection among ARD cases were higher in 2006 than 2005. There were increasing numbers of invasive GABHS cases beginning in August 2006 (following the discontinuation of routine BPG prophylaxis in July 2006 due to a supply shortage). A high proportion (and the most severe) of the invasive cases in 2006 occurred in one battalion; of note, the same battalion had the highest prevalence of GABHS infections among ARD

Table 1. Hospitalized cases of invasive group A beta hemolytic streptococcal (GABHS) disease, by clinical expression, Fort Leonard Wood, MO, by year, January 2005-November 2006

	2005				2006 (through November)			
			Total				Total	
Clinical expression	Confirmed	Probable	Number	% of total	Confirmed	Probable	Number	% of total
Necrotizing fasciitis	0	0	0	0.0	4	0	4	10.5
Streptococcal toxic shock	0	0	0	0.0	1	1	2	5.3
Peritonsillar abscess	6	4	10	58.8	9	6	15	39.5
Pneumonia	3	3	6	35.3	8	4	12	31.6
Other*	1	0	1	5.9	5	0	5	13.2
Total	10	7	17	100.0	27	11	38	100.0

*includes deep neck and parapharyngeal abscess (n=4), septic arthritis/bursitis (n=1), and sinusitis (n=1)

cases during the year. Despite general increases in GABHS positive throat cultures in 2006, the weekly ARD rate and the Strep-ARD Surveillance Index (SASI) remained stable and relatively low through September of the year. Finally, one predominant GABHS strain (M5.14) circulated at FLW during the outbreak.

Interventions: Following the identification of the second case of necrotizing fasciitis, all non-allergic members of the most affected battalion were given BPG from emergency stocks. Prophylaxis of all new accessions with oral penicillin (Pen VK) twice daily for 28 days was begun in late October. Shortly thereafter, additional doses of BPG were obtained from King Pharmaceuticals to extend the mass treatment regimen. Thus, to eradicate virulent strains of GABHS and prevent new infections among trainees in general, beginning in late October, all non-allergic trainees received either BPG or a 28-day course of Pen VK.

Recommendations: The consultation team recommended that routine prophylaxis of all non-allergic new accessions to basic combat training should

Figure 1. Hospitalized cases of invasive GABHS disease, Fort Leonard Wood, MO, by month, Jan 2005-Nov 2006

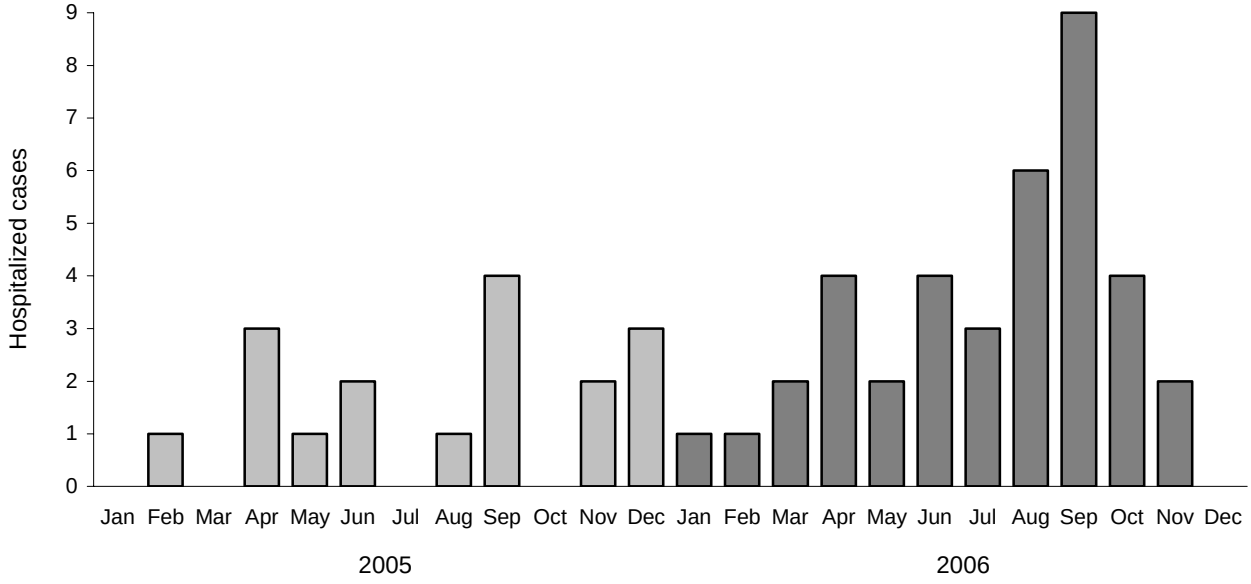
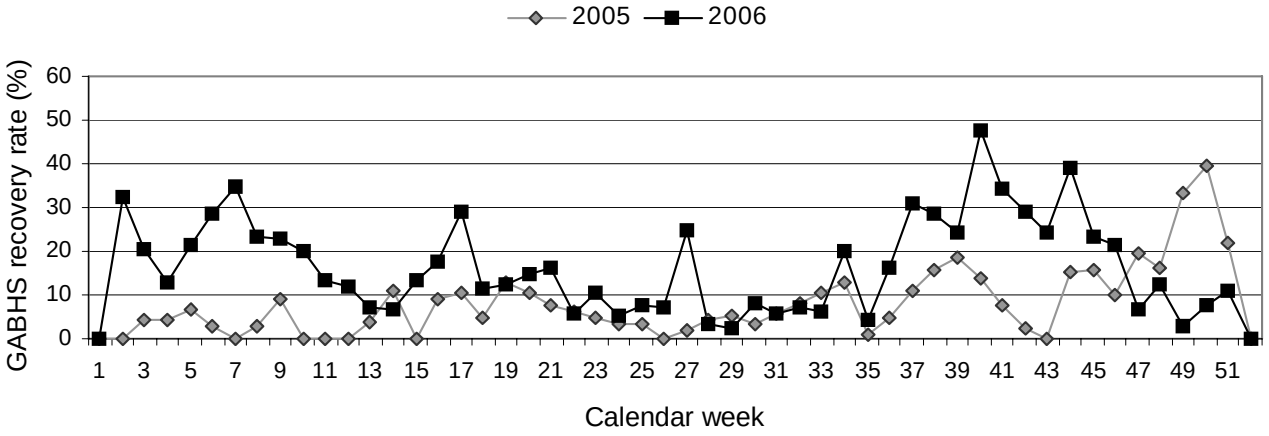


Figure 2. GABHS-positive throat cultures among trainees with ARD, Fort Leonard Wood, MO, by week, 2005-2006



be conducted with Pen VK for 28 days until BPG supplies were restored. Also, surveillance of ARD, GABHS infections, and invasive GABHS disease should be enhanced for the remainder of the ARD season. These efforts should include active case finding and additional laboratory testing for GABHS. Finally, healthcare providers and ancillary medical staff members should be informed regarding recognition and reporting of GABHS disease, other elements of the Army Acute Respiratory Disease Surveillance Program, and the importance of obtaining throat cultures for patients presenting with ARD complaints.

Editorial comment: Outbreaks of severe disease related to group A beta hemolytic streptococcal infections have been considered significant threats to military trainees since World War II.[2] In the early 1950s, the U.S. military's Streptococcal Disease Laboratory at Warren Air Force Base, Wyoming, conducted landmark studies that established the effectiveness of a single dose of long-acting (benzathine) penicillin for the treatment of GABHS infections and the prevention of long-term sequelae (e.g., acute rheumatic fever).[2,3] They also demonstrated the effectiveness of mass prophylaxis of military trainees to prevent or counter outbreaks of GABHS-related diseases.[2,4] Since then, treatment of all non-allergic trainees with BPG before they begin training ("tandem prophylaxis") and/or all members of trainee populations to counter epidemics ("mass prophylaxis") have been mainstays of recruit health practice.[1,2,4-6]

The outbreak described in this report documents the persistent threat of group A streptococcal disease to military trainees and the importance of countermeasures and surveillance (particularly at Fort Leonard Wood which has had recurrent outbreaks of GABHS-related disease in the absence of prophylaxis).[1,6] Several findings are of particular interest. First, ARD rates and the Strep-ARD Surveillance Index (SASI) did not significantly increase before the outbreak of severe GABHS-related disease. The GABHS recovery rate alone would have been a better indicator of an emerging outbreak of significant GABHS-related disease; and increasing numbers of relatively severe clinical manifestations of GABHS, e.g., peritonsillar abscess, could have signalled the presence and transmission of an invasive GABHS strain. Second, while the outbreak was associated with a single M-type, the clinical expressions during the outbreak were remarkably variable, including streptococcal toxic shock, necrotizing fasciitis, peritonsillar abscess, pneumonia, and pharyngitis. Such variability of clinical manifestations of GABHS during outbreaks (even when associated with a single strain) is typical.[1] In turn, all providers of care to trainees must be alert for severe manifestations and/or unusually high numbers of GABHS-related illnesses in their practices. Third, since the 1950s, long-acting injectable penicillin, rather than oral penicillin (which requires multiple daily doses), has been used for prophylaxis of GABHS in military trainees.[4] In this case, oral penicillin was used in the absence of long-acting BPG on a mass basis with special measures to ensure (and appropriately document) compliance. The experience documented in this report may be useful if supplies of BPG are interrupted or unavailable in the future.

Reported by Steven B. Cersovsky, LTC, MC, Joshua Hawley, MAJ, MC, Duvel White, MAJ, MC, Bryony Soltis, MAJ, MC and Seung-eun Lee; General Leonard Wood Army Community Hospital: Theresa Sullivan, COL, AN, Mimms Mabee, COL, MC, Jeffrey Leggit, MTC, MC, Bruce Russell and Susan Wolf.

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Update: Malaria, U.S. Armed Forces, 2006

Malaria is a mosquito-transmitted parasitic disease that is endemic throughout the tropics and in some temperate regions. Malaria accounts for as many as 300 million acute illnesses and more than 1 million deaths each year worldwide. Four *Plasmodium* species are capable of infecting humans and causing malaria: *Plasmodium falciparum* (the most deadly), *Plasmodium vivax* (the most common), *Plasmodium ovale*, and *Plasmodium malariae*.[1]

Throughout history, malaria has been a disease of military operational importance.[2,3] Currently, U.S. servicemembers are at risk of malaria when they participate in training or military operations in endemic areas (e.g., Afghanistan); when they are permanently assigned to endemic areas (e.g., near the Demilitarized Zone in Korea[4,5]); or when they visit malarious areas during personal travels.

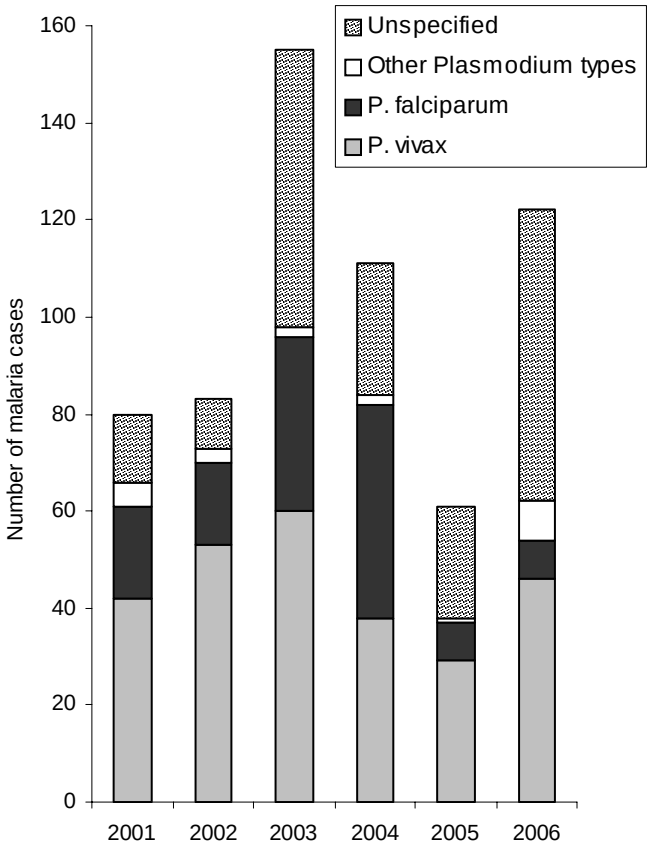
Since 2001, malaria (particularly *P. vivax*) has threatened U.S. military forces that conduct/support operations in Afghanistan.[6,7] For example, in 2002, 38 U.S. Army Rangers acquired vivax malaria while operating in eastern Afghanistan.[7] In contrast, malaria endemicity in Iraq is low, and very few, if any, malaria infections have been acquired in Iraq by U.S. service members.[8] This report summarizes the malaria experiences of U.S. service members during calendar year 2006 and compares it to recent experience.

Methods: The Defense Medical Surveillance System was searched to identify inpatient medical encounters and reports to the Army's Reportable Medical Events System (RMES) that included primary (first-listed) diagnoses of malaria (ICD-9-CM: 084.0-084.9) among U.S. service members during calendar years 2001 through 2006. For this summary, only one episode of malaria per service member per year was included. When multiple records were available for a single case, the date of the earliest was considered the date of clinical onset, and the most specific diagnosis (typically from an inpatient record) was used to classify the type.

Presumed locations of malaria acquisition were estimated using the following algorithm: (1) cases diagnosed in Korea were considered Korea-acquired; (2) cases among service members who had been assigned to Korea within one year of diagnosis were considered acquired in Korea; (4) cases documented through RMES that listed exposures to other malaria endemic locations were considered to be acquired in those locations; (5) cases among service members deployed to Afghanistan within one year of diagnosis were considered acquired in Afghanistan; (6) all remaining cases were considered acquired in "unknown" areas.

Results: In 2006, 122 service members were diagnosed or reported with malaria. Forty-six cases (38%) were attributed to *P. vivax*, 8 cases (7%) to *P. falciparum* and 8 cases to other *Plasmodium* species. Nearly half the cases were reported as "unspecified" type (Table 1). Most service members diagnosed with malaria in 2006 were males (96%), younger than 30 (66%), white non-Hispanic (74%), and in the active component (95%) (Table 1).

Figure 1. Malaria cases by plasmodium species and year, U.S. Armed Forces, 2001-2006



The number of malaria cases in 2006 was exactly twice that of 2005 and higher than in each of the previous five years except 2003 (Figure 1). Since 2003, the percentage of malaria cases identified as *P. vivax* has been relatively stable, while the percentage of *P. falciparum* cases has declined. Of note, the number of cases attributed to "other *Plasmodium*" types was greater in 2006 than in previous years. Of the eight "other *Plasmodium*" cases in 2006, four were reported as *P. malariae* and four as *P. ovale*.

In 2006, malaria cases were hospitalized in or reported from 31 different medical facilities at 29 installations in the United States, Guam, Korea and Europe (Table 2). Six facilities reported nearly three-quarters of the 2006 cases: Womack Army Medical Center in Fort Bragg, NC (n=26), the 121st General Hospital in Seoul, Korea (n=19), Bassett Army Community Hospital in Fort Wainwright, AK (n=17), Landstuhl Regional Medical Center in Germany (n=11), Madigan Army Medical Center in Fort Lewis, WA (n=9) and Tripler Army Medical Center in Fort Shafter, HI (n=7).

More than half of the 2006 malaria infections were presumably acquired in Afghanistan (n=69, 57%) (Table 2). Korea-acquired cases (n=25) accounted for one-fifth of the 2006 total. Of note, all of the cases presumably acquired in Afghanistan and one-quarter of the cases presumably acquired in Korea were reported from installations in the United States or Europe.

Finally, cases acquired in Afghanistan presented throughout the year, though the number of cases peaked in the summer months (Figure 2). Nearly all Korea-acquired cases presented during May through October. In 2006 compared to 2005, there were 46 more cases presumably acquired in Afghnaistan and 7 more in Korea.

Analysis by Lucy Hsu, MPH, Army Medical Surveillance Activity.

Table 1. Malaria cases by plasmodium species and selected demographic characteristics, U.S. Armed Forces, 2006

	P. vivax	*P. falciparum*	Other *Plasmodium*	Unspecified	Total	Percent of total
Total	**46**	**8**	**8**	**60**	**122**	**100.0%**
Gender						
Male	43	8	7	59	**117**	95.9%
Female	3	0	1	1	**5**	4.1%
Age group						
<20	0	0	0	3	**3**	2.5%
20-24	25	1	3	23	**52**	42.6%
25-29	9	1	0	16	**26**	21.3%
30-34	4	2	3	8	**17**	13.9%
35-39	7	3	2	5	**17**	13.9%
40+	1	1	0	5	**7**	5.7%
Race/ethnicity						
White	34	5	7	44	**90**	73.8%
Black	4	3	1	3	**11**	9.0%
Hispanic	5	0	0	6	**11**	9.0%
Other	3	0	0	7	**10**	8.2%
Service						
Army	40	4	5	56	**105**	86.1%
Navy	1	0	2	1	**4**	3.3%
Air Force	3	2	1	2	**8**	6.6%
Marine Corps	2	2	0	1	**5**	4.1%
Component						
Active	43	8	8	57	**116**	95.1%
Reserve/Guard	3	0	0	3	**6**	4.9%

Editorial comment: In the past six years, the peak of malaria cases among service members was in 2003. After sharply lower numbers of cases in 2004 and 2005, there was a relative resurgence in 2006.

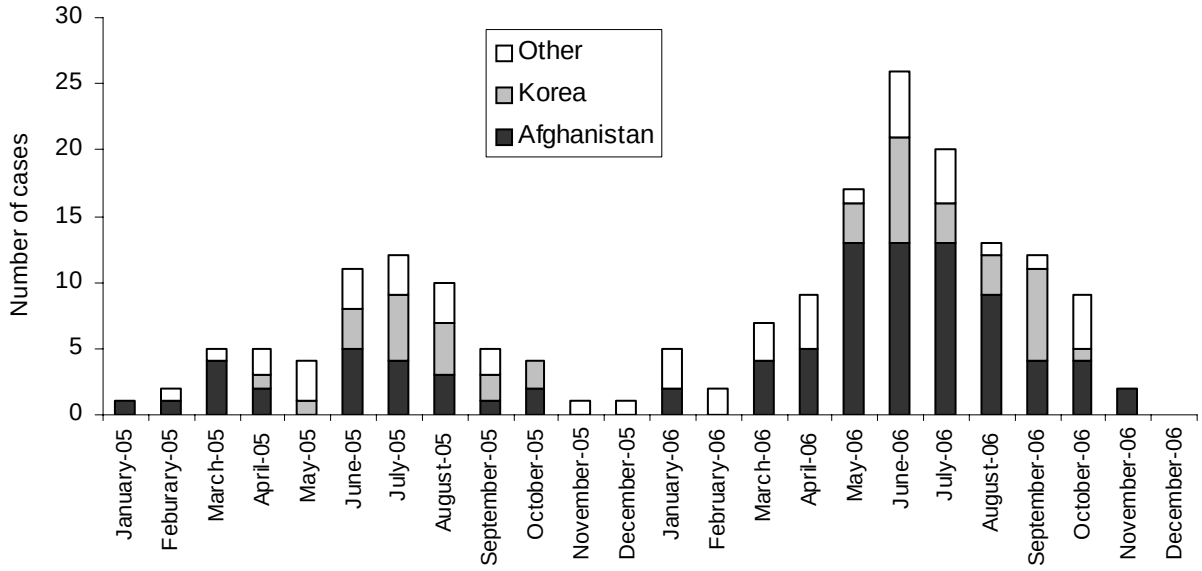
For several years prior to and through 2004, most cases of malaria among U.S. service members were presumably acquired in Korea.[9] Declines in Korea-associated cases after 2004 likely reflected the effects of preventive measures among U.S. forces in Korea as well as the Republic of Korea government's directed malaria control program.[10] In 2005, the number of cases presumably acquired in Afghanistan (n=23) was approximately 30% higher than the number of cases presumably acquired in Korea (n=18); whereas in 2006, there were nearly three times as many cases presumably acquired in Afghanistan as in Korea. The reasons for the increase in Afghanistan-acquired cases are unclear.

For several reasons, most cases of malaria among U.S. service members in 2006 were diagnosed at medical facilities remote from malaria endemic areas. For example, clinical manifestations of *P. vivax* infections acquired in Afghanistan may be suppressed until chemoprophylaxis taken routinely while deployed is terminated following deployment[7]. In addition, *P. vivax* infections acquired in Afghanistan and Korea often have long latency periods and may clinically present months after exposure.[11,12] Providers of medical care to U.S. service members—during all seasons and in all locations—should be alert for service

Table 2. Number of malaria cases by geographical locations of diagnosis or report and presumed location of acquisition, U.S. Armed Forces, 2006

			Presumed location of infection acquisition				
Location of diagnosis/report	Number of cases	Percent of total	Afghanistan	Korea	Africa	Central/ South America	Other/ Unknown
Fort Bragg, NC	26	21.3	22	1	0	0	3
Seoul, Korea	19	15.6	0	19	0	0	0
Fort Wainwright, AK	17	13.9	17	0	0	0	0
Landstuhl, Germany	11	9.0	8	0	0	0	3
Fort Lewis, WA	9	7.4	8	1	0	0	0
Fort Shafter, HI	7	5.7	4	1	1	0	1
Fort Stewart, GA	5	4.1	2	2	0	0	1
Wuerzburg, Germany	3	2.5	1	1	0	0	1
Vicenza, Italy	2	1.6	2	0	0	0	0
Eglin AFB, FL	2	1.6	0	0	0	1	1
Fort Knox, KY	2	1.6	2	0	0	0	0
Washington, DC	2	1.6	1	0	0	0	1
San Diego, CA	1	0.8	0	0	0	0	1
USAF Academy, CO	1	0.8	1	0	0	0	0
Fort Benning, GA	1	0.8	0	0	0	0	1
Non-military facility, GA	1	0.8	0	0	0	0	1
Andrews AFB, MD	1	0.8	0	0	0	0	1
Camp Lejeune, NC	1	0.8	0	0	1	0	0
New Orleans, LA	1	0.8	0	0	0	0	1
Altus AFB, OK	1	0.8	0	0	0	0	1
Fort Hood, TX	1	0.8	0	0	1	0	0
Randolph AFB, TX	1	0.8	0	0	0	1	0
Oak Harbor, WA	1	0.8	0	0	0	0	1
Agana, Guam	1	0.8	0	0	1	0	0
Andersen AFB, Guam	1	0.8	0	0	0	0	1
Geilenkirchen AB, Germany	1	0.8	1	0	0	0	0
Heidelberg, Germany	1	0.8	0	0	0	0	1
NAS Sigonella, Italy	1	0.8	0	0	1	0	0
Rota, Spain	1	0.8	0	0	0	0	1
Total	**122**	**100.0**	**69**	**25**	**5**	**2**	**21**

Figure 2. Diagnoses and reported cases of malaria, by location of acquisition of infection, by month of clinical presentation/diagnosis, U.S. Armed Forces, 2005-2006



members who present with clinical syndromes consistent with malaria who traveled to or were assigned/deployed to malaria-endemic areas (especially Afghanistan and/or Korea).

Finally, all soldiers at risk of malaria (and other arthropod-transmitted infections) should be informed of the nature of the risk; trained, equipped, and supplied to conduct indicated countermeasures; and monitored to ensure compliance. Personal protective measures against malaria include the proper wear of permethrin-impregnated uniforms; the use of bed nets and military-issued DEET-containing insect repellent; and compliance with prescribed chemoprophylactic drugs before, during, and after times of exposure in malarious areas.

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Update: Pre- and Post-Deployment Health Assessments, U.S. Armed Forces, January 2003-December 2006

The June 2003 issue of the *MSMR* summarized the background, rationale, policies, and guidelines related to pre-deployment and post-deployment health assessments of service members.[1-10] Briefly, prior to deploying, the health of each service member is assessed to ensure his/her medical fitness and readiness for deployment. At the time of redeployment, the health of each service member is again assessed to identify medical conditions and/or exposures of concern to ensure timely and comprehensive evaluation and treatment.

Completed pre- and post-deployment health assessment forms are routinely sent to the Army Medical Surveillance Activity (AMSA) where they are archived in the Defense Medical Surveillance System (DMSS).[11] In the DMSS, data recorded on pre- and post-deployment health assessments are integrated with data that document demographic characteristics, military experiences, and medical encounters of all service members (e.g., hospitalizations, ambulatory visits, immunizations).[11] The continuously expanding DMSS database can be used to monitor the health of service members who participated in major overseas deployments.[11-14]

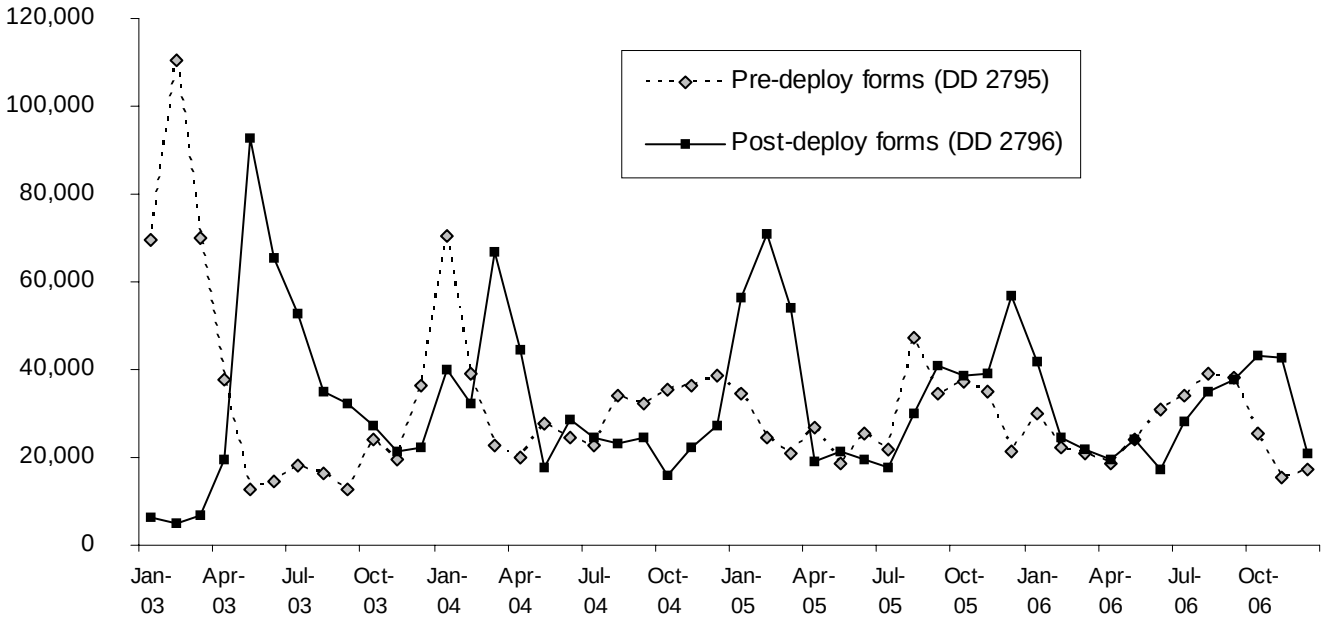
The overall success of deployment force health protection efforts depends at least in part on the completeness and quality of pre- and post-deployment health assessments. This report summarizes characteristics of service members who completed pre-and post-deployment forms since 1 January 2003, responses to selected questions on pre- and post-deployment forms, and changes in responses of individuals from pre-deployment to post-deployment.

Methods: For this update, the DMSS was searched to identify all pre- and post-deployment health assessments (DD Form 2795 and DD Form 2796, respectively) that were completed after 1 January 2003.

Results: From 1 January 2003 to 31 December 2006, 1,511,170 pre-deployment health assessments and 1,574,868 post-deployment health assessments were completed at field sites, shipped to AMSA, and integrated in the DMSS database (Figure 1).

In general, the distributions of self-assessments of "overall health" were similar among pre- and post-deployment form respondents (Figure 2). For example,

Figure 1. Total pre- and post-deployment health assessments, by month, U.S. Armed Forces, January 2003-December 2006



both prior to and after deployment, the most frequent descriptor of "overall health" was "very good." Of note, however, relatively more pre- (33%) than post- (23%) deployment respondents assessed their overall health as "excellent"; while more post- (41%) than pre- (25%) deployment respondents assessed their overall health as "good," "fair," or "poor" (Figure 2).

Among service members (n=779,984) who completed both a pre- and a post-deployment health assessment, fewer than half (44%) chose the same descriptor of their overall health before and after deploying (Figures 3, 4). Of those (n=434,052) who changed their assessments from pre- to post-deployment, three-fourths (75%) changed by a single category (on a five category scale) (Figure 4); and of those who changed by more than one category, nearly 5-times as many indicated a decrement in overall health (n=89,643; 11.5% of all respondents) as an improvement (n=18,756; 2.4% of all respondents) (Figure 4).

On post-deployment forms, 22% of active and 41% of Reserve component respondents reported "medical/dental problems" during deployment (Table 1). Among active component respondents, "medical/dental problems" were more frequently reported by soldiers and Marines than by members of the other Services. Among Reservists, members of the Air Force reported "medical/dental problems" much less often than members of the other Services (Table 2).

Approximately 5% and 6% of active and Reserve component respondents, respectively, reported "mental health concerns." "Mental health concerns" were reported relatively more frequently among soldiers (active: 7%; Reserve: 8%) than members of the other Services (Table 1). Post-deployment forms from approximately one-fifth (18%) of active component and one-fourth (24%) of Reserve component

Figure 2. Percent distributions of self-assessed health status, pre- and post-deployment, U.S. Armed Forces, January 2003-December 2006

Figure 3. Self-assessed health status on post-deployment form, in relation to self-assessed health status on pre-deployment form, U.S. Armed Forces, January 2003-December 2006

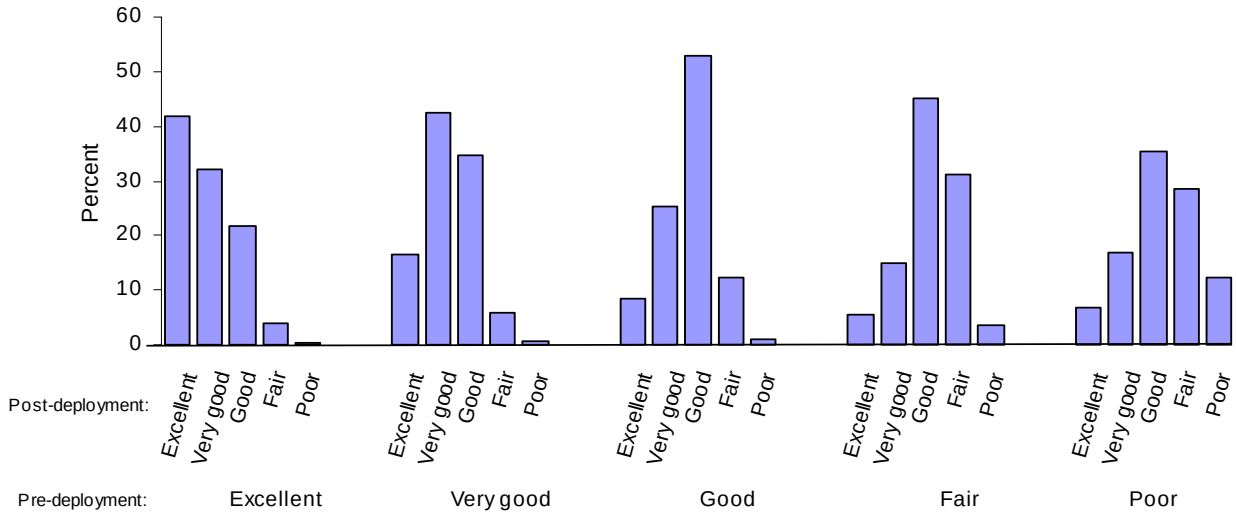
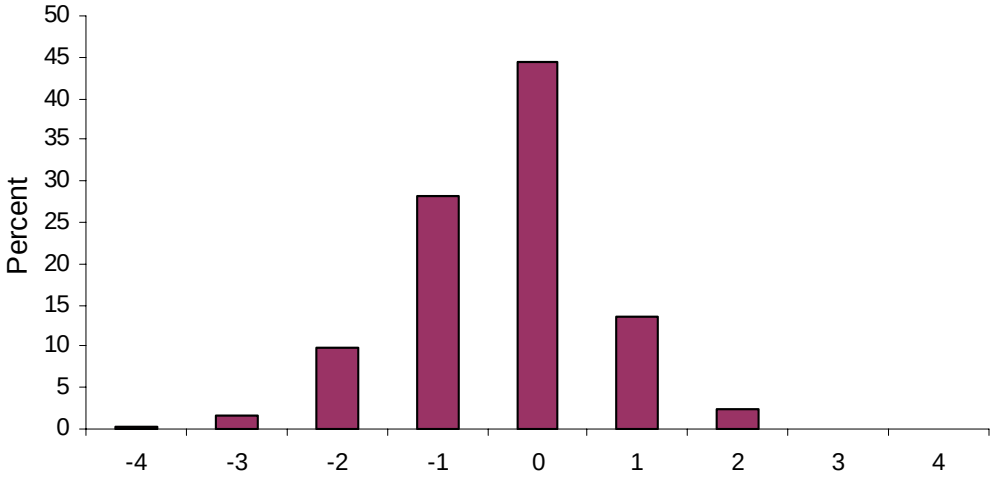


Figure 4. Distribution of changes in self-assessed health status as reported on pre- and post-deployment forms, U.S. Armed Forces, January 2003-December 2006



Change in self-assessment of overall health status, pre- to post-deployment, calculated as: post deployment response - pre-deployment response, using the following scale for health status: 1="poor"; 2="fair"; 3="good"; 4="very good"; and 5="excellent".

Table 1. Responses to selected questions from post-deployment forms by service and component, U.S. Armed Forces, January 2003-December 2006

	Army	Navy	Air Force	Marine Corps	Total
Active component					
DD 2796	**336,244**	**109,315**	**133,537**	**102,290**	**681,386**
Electronic version	83%	12%	76%	28%	62%
General health ("fair" or "poor")	9%	5%	2%	5%	6%
Medical/dental problems during deploy	31%	12%	12%	20%	22%
Currently on profile	11%	2%	2%	2%	6%
Mental health concerns	7%	3%	1%	2%	5%
Exposure concerns	17%	5%	5%	10%	11%
Health concerns	13%	6%	6%	9%	10%
Referral indicated	26%	7%	10%	14%	18%
Med. visit following referral[1]	97%	71%	89%	66%	91%
Post deployment serum[2]	94%	82%	90%	88%	91%
Reserve component					
DD 2796	**290,280**	**17,985**	**45,920**	**21,598**	**375,783**
Electronic version	75%	18%	66%	27%	68%
General health ("fair" or "poor")	11%	6%	2%	8%	9%
Medical/dental problems during deploy	45%	36%	15%	35%	41%
Currently on profile	15%	4%	2%	3%	12%
Mental health concerns	8%	4%	1%	3%	6%
Exposure concerns	25%	20%	8%	25%	23%
Health concerns	22%	21%	11%	22%	21%
Referral indicated	27%	19%	11%	24%	24%
Med. visit following referral[1]	91%	80%	59%	55%	87%
Post deployment serum[2]	94%	91%	70%	89%	91%

[1] Inpatient or outpatient visit within 6 months after referral

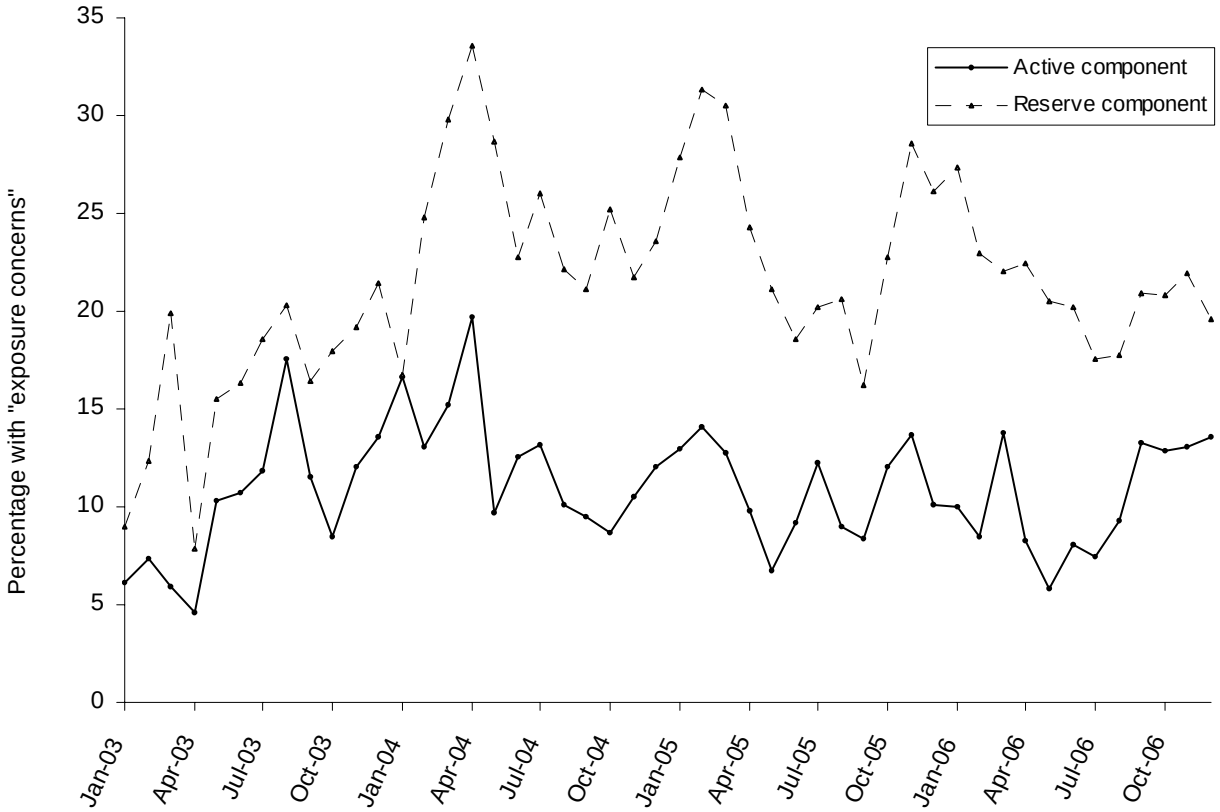
[2] For DD 2796 completed since 1 June 2003

members documented that "referrals" were indicated (Table 1); and 91% and 87% of all active and Reserve component respondents, respectively, had hospitalizations and/or medical encounters within 6 months after documented post-deployment referrals (Table 1).

During interviews by health care providers, approximately 16% of respondents expressed concerns about possible exposures or events during the deployment that they felt may affect their health ("exposure concerns") (Table 2). The proportion of respondents who reported exposure concerns significantly varied from month to month. In general, in the active components, rates of exposure concerns increased through calendar year 2003 and have been relatively stable (5-15%) since the spring of 2004 (Figure 5). In the Reserve components, rates of exposure concerns increased through the spring of 2004 and have been relatively high (15-30%) since then. Reports of exposure concerns have been generally higher in the Army and Marine Corps than the other services and in the Reserve compared to the active component. Finally, prevalences of exposure concerns increase with age (Table 2).

Editorial comment: Since January 2003, approximately 75% of U.S. service members have assessed their overall health as "very good" or "excellent" when they are mobilized and/or prior to deploying overseas; and approximately 60% have assessed their overall health as "very good" or "excellent" at the end of their deployments. Most of the changes in assessments of overall health from pre- to post-deployment have been relatively minor (i.e., one category on a 5-category scale). Still, however, approximately one of nine post-deployers have indicated relatively significant declines (i.e., two or more categories) in their overall health from pre- to post-deployment. The findings are attributable at least in part to the extreme physical and psychological stresses associated with mobilization, overseas

Figure 5. Proportion of post-deployment forms that include reports of exposure concerns, by month, US Armed Forces, January 2003-December 2006



deployment, and harsh and dangerous living and working conditions.[15-17]

The deployment health assessment process is specifically designed to identify, assess, and follow-up as necessary all service members with concerns regarding their health and/or deployment-related exposures. Overall, for example, approximately one-fifth of all returning soldiers had "referral indications" documented on post-deployment health assessments; and of those, most had documented outpatient visits and/or hospitalizations within 6 months after they returned.

Of interest, "exposure concerns" among post-deploying respondents significantly vary from month to month. Since the beginning of 2004, exposure concerns have been much more common among Reserve compared to active component members. Among both active and Reserve component members, exposure concerns significantly increase with age, and in both components, service members older than 40 are approximately twice as likely as those younger than 20 to report exposure concerns.

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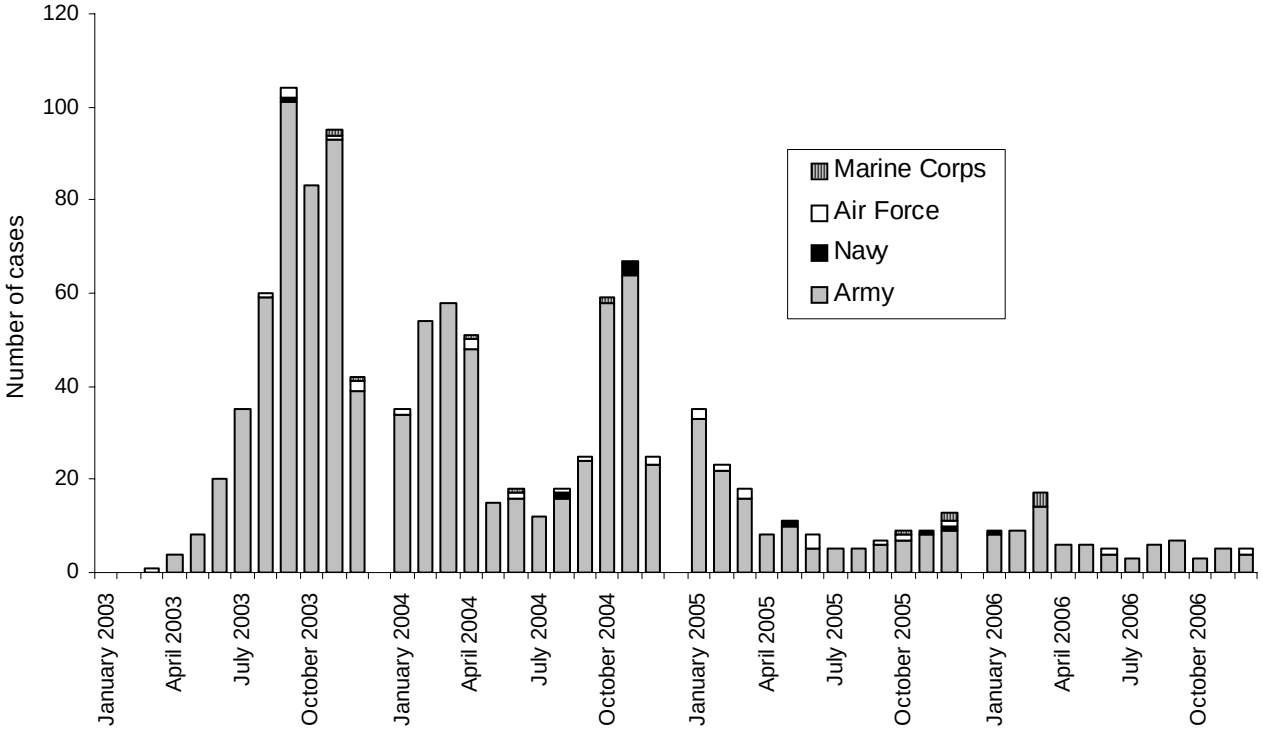
Table 2. Proportion of post-deployment forms that include reports of exposure concerns, by age group and component, U.S. Armed Forces, January 2003-December 2006

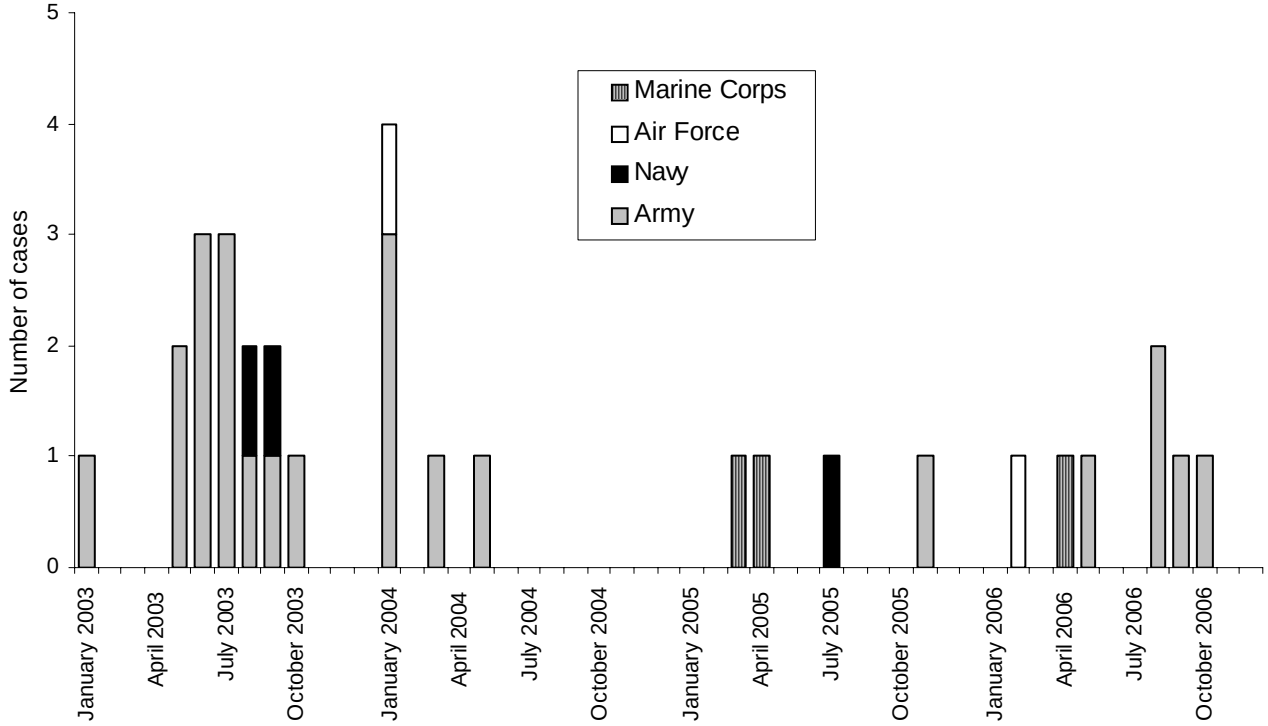
Age group	Active	Reserve
<20	6.1	14.0
20-29	10.2	20.3
30-39	13.0	23.8
>39	16.0	26.0

Deployment-related conditions of special surveillance interest, U.S. Armed Forces, by month and service, January 2003-December 2006

Leishmaniasis (ICD-9-CM: 085.0-85.5)[1]

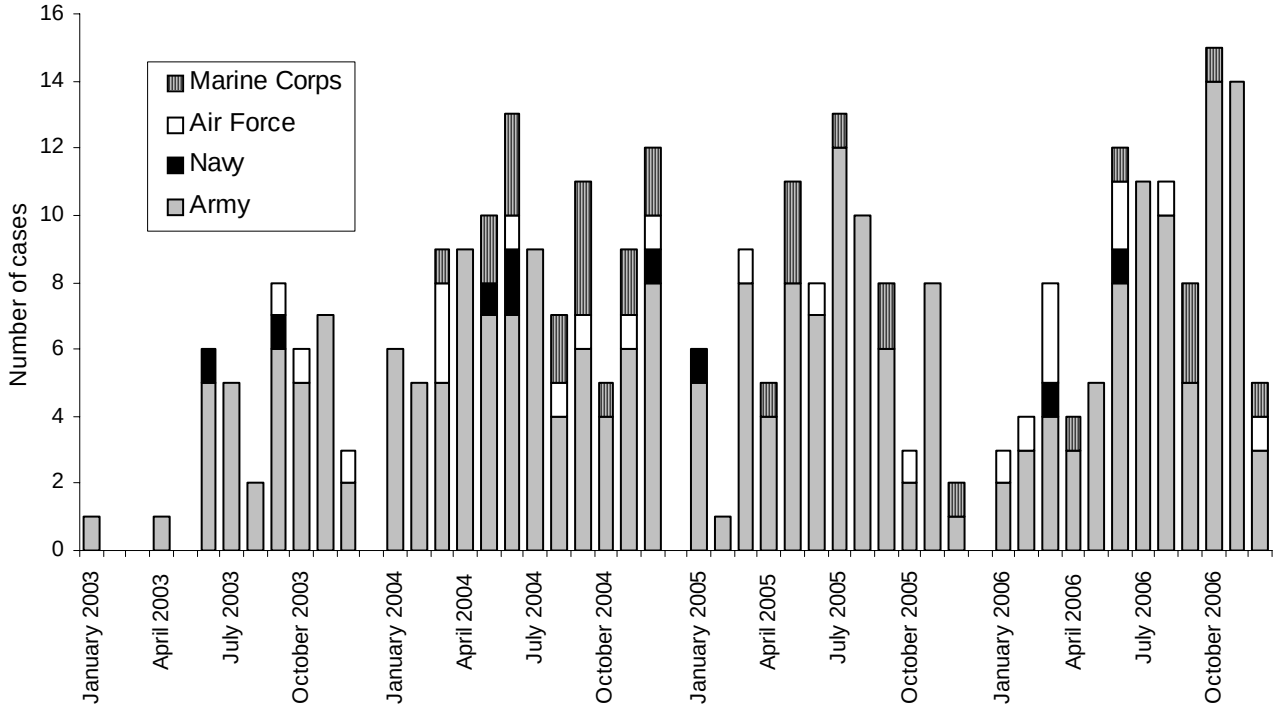


Acute respiratory failure/ARDS (ICD-9-CM:518.81, 518.82)[2]

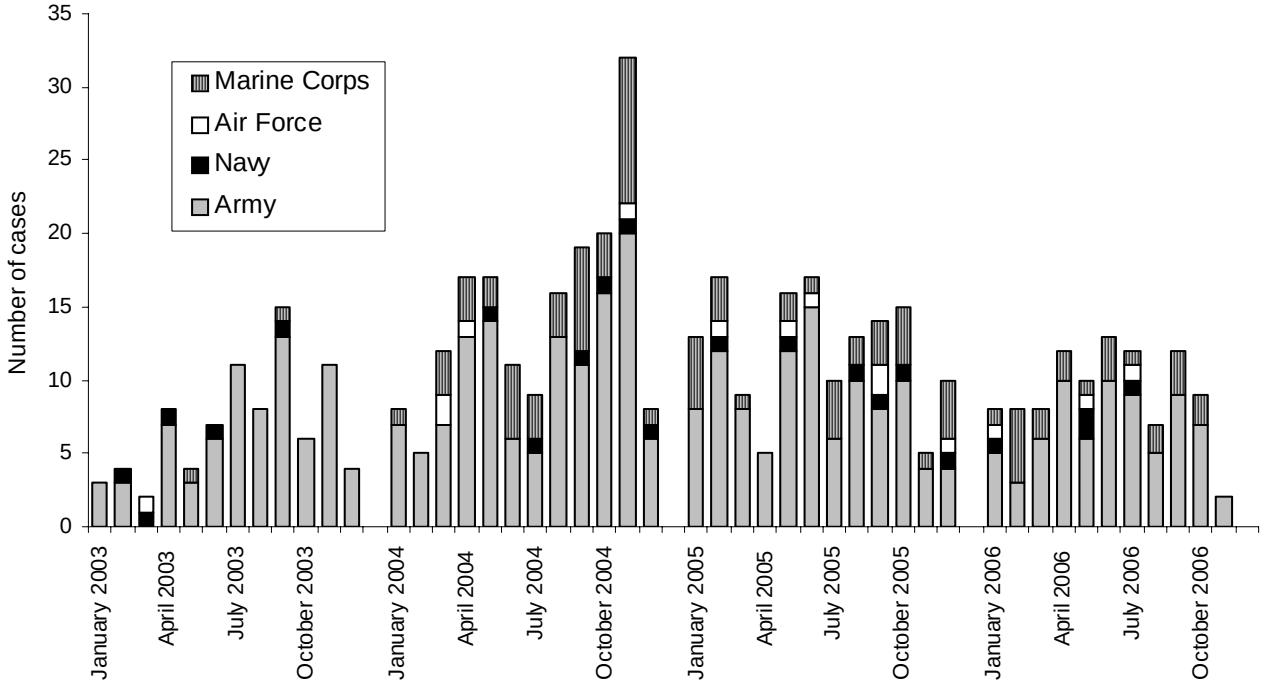


Footnotes:
[1] Indicator diagnosis (one per individual) during a hospitalization, ambulatory vist, and/or from a notifiable medical event during/after service in OEF/OIF.
[2] indicator diagnosis (one per individual) during a hospitalization while deployed to/within 30 days of returning from OEF/OIF.

Deep vein phlebitis/thromboembophlebitis and/or pulmonary embolism/infarction (ICD-9-CM: 541.1, 451.81, 415.1)[3]



Amputations (ICD-9-CM: 84.0, 84.1, 887, 896, V49.6, V49.7)[4]



Footnotes:
[3] Indicator diagnosis (one per individual) during a hospitalization or ambulatory visit while deployed to/within 30 days of returning from OEF/OIF.
[4] Indicator diagnosis (one per individual) during a hospitalization of a servicemember during/after service in OEF/OIF.

Sentinel reportable events for all beneficiaries[1] at U.S. Army medical facilities, cumulative numbers[2] for calendar years through December 31, 2005 and 2006

Reporting location	Number of reports all events[3]		Food-borne								Vaccine Preventable					
			Campylo-bacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
NORTH ATLANTIC																
Washington, DC Area	382	289	4	5	10	3	5	4	6	.	.	.	3	1	2	.
Aberdeen, MD	60	11	.	.	.	.	.	.	1	.	.	.	.	.	.	.
FT Belvoir, VA	374	345	9	11	1	1	8	11	1	3	.	.	1	.	.	5
FT Bragg, NC	1,611	1,773	8	13	.	.	27	35	3	.	.	.	.	.	.	.
FT Drum, NY	183	218	.	.	.	.	.	.	.	.	.	.	.	.	.	.
FT Eustis, VA	288	232	.	.	.	.	1	1	.	.	.	.	.	.	.	.
FT Knox, KY	299	300	4	.	.	2	4	1	.	2	.	.	.	.	.	.
FT Lee, VA	216	366	.	.	.	.	1	.	.	.	.	.	.	.	.	4
FT Meade, MD	126	114	.	.	.	.	1	2	.	.	.	.	.	1	1	.
West Point, NY	51	56	.	.	.	.	.	1	.	.	.	.	.	3	.	.
GREAT PLAINS																
FT Sam Houston, TX	498	324	.	.	.	1	5	2	2	.	6	2	10	5	.	.
FT Bliss, TX	393	547	1	.	6	2	5	12	7	2	.	3	.	2	.	1
FT Carson, CO	822	832	6	1	3	3	5	5	.	.	1	2	.	.	.	.
FT Hood, TX	2,397	1,763	7	7	1	3	13	12	4	13	.	.	.	.	.	1
FT Huachuca, AZ	72	100	1	.	.	.	.	11	.	.	.	.	.	.	.	.
FT Leavenworth, KS	61	57	.	.	.	4	1	.	1	.	.	.	.	.	.	.
FT Leonard Wood, MO	357	326	1	1	1	6	1	2	.	.	.	.	.	.	3	6
FT Polk, LA	256	236	1	2	1	1	5	3	.	.	.	2	1	.	.	.
FT Riley, KS	304	256	.	2	2	.	2	.	.	.	.	.	.	.	.	.
FT Sill, OK	164	229	.	.	1	.	.	1	2	.	.	.	.	.	.	2
SOUTHEAST																
FT Gordon, GA	394	479	.	.	.	.	.	.	.	.	.	.	8	11	2	1
FT Benning, GA	347	485	2	3	1	1	9	13	2	2	.	.	.	.	.	.
FT Campbell, KY	794	685	3	1	1	.	9	1	4	.	.	.	.	.	1	.
FT Jackson, SC	212	271	.	.	.	.	.	.	.	.	2	.	.	1	.	1
FT Rucker, AL	30	89	.	1	.	.	.	5	.	.	.	.	.	.	.	.
FT Stewart, GA	559	1,014	.	.	2	.	16	9	27	20	8	4	33	12	1	3
WESTERN																
FT Lewis, WA	527	603	4	.	.	.	1	5	.	.	.	.	.	1	.	1
FT Irwin, CA	74	103	.	1	.	.	1	.	.	1	.	.	1	.	.	.
FT Wainwright, AK	159	194	4	.	.	.	2	4	.	.	.	.	.	.	1	1
OTHER LOCATIONS																
Hawaii	840	945	36	39	7	1	15	13	4	2	1	1	1	.	1	2
Europe	1,468	1,015	16	13	1	3	23	25	1	.	3	2	7	2	3	1
Korea	540	671	1	.	.	.	.	.	.	.	1	.	1	3	.	5
Total	**14,858**	**14,928**	**108**	**100**	**38**	**31**	**160**	**178**	**65**	**45**	**22**	**16**	**66**	**42**	**15**	**34**

[1] Includes active duty service members, dependents, and retirees

[2] Events reported by Jan 7, 2006 and 2007

[3] Seventy events specified by Tri-Service Reportable Events, Version 1.0, July 2000.

Note: Completeness and timeliness of reporting vary by facility

Source: Army Reportable Medical Events System

Sentinel reportable events for all beneficiaries[1] at U.S. Army medical facilities, cumulative numbers[2] for calendar years through December 31, 2005 and 2006

Reporting location	Arthropod-borne				Sexually Transmitted								Environmental			
	Lyme disease		Malaria		Chlamydia		Gonorrhea		Syphilis[4]		Urethritis[5]		Cold		Heat	
	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
NORTH ATLANTIC																
Washington, DC Area	1	3	3	2	164	162	24	28	8	5	.	1	1	.	2	.
Aberdeen, MD	3	.	.	.	20	8	3	1	2	.	.	.	.	.	.	.
FT Belvoir, VA	1	2	.	.	223	198	46	46	.	.	.	.	.	.	.	.
FT Bragg, NC	.	2	.	21	1,118	1,228	213	192	3	4	107	130	1	2	112	135
FT Drum, NY	.	.	.	.	126	193	8	24	.	.	.	.	2	.	1	.
FT Eustis, VA	.	.	.	.	166	155	35	48	.	.	.	.	2	.	38	19
FT Knox, KY	1	6	1	2	190	208	34	50	.	2	.	.	7	5	20	11
FT Lee, VA	1	.	.	.	173	283	36	49	.	.	.	.	.	.	5	3
FT Meade, MD	.	.	.	.	112	96	12	13	.	.	.	1	.	.	.	.
West Point, NY	7	16	.	.	31	26	2	.	.	.	.	.	1	1	3	2
GREAT PLAINS																
FT Sam Houston, TX	.	.	.	.	312	238	85	58	5	5	.	.	.	.	11	1
FT Bliss, TX	.	.	1	1	172	315	46	61	7	5	.	.	.	.	14	9
FT Carson, CO	.	.	4	.	594	596	81	104	.	.	24	42	1	1	.	.
FT Hood, TX	.	.	1	1	1,462	1,187	467	281	1	.	196	47	.	.	139	32
FT Huachuca, AZ	.	.	.	.	53	77	15	11	.	.	.	.	.	1	2	.
FT Leavenworth, KS	.	.	.	.	48	47	7	6	1	.	.	.	1	.	2	.
FT Leonard Wood, MO	.	.	1	.	225	232	47	20	2	.	1	.	4	.	19	15
FT Polk, LA	.	.	1	.	152	127	40	41	1	2	.	.	.	.	48	58
FT Riley, KS	.	.	.	.	190	205	56	35	.	.	.	.	9	2	11	10
FT Sill, OK	.	.	.	.	56	76	31	27	4	2	.	.	.	.	31	58
SOUTHEAST																
FT Gordon, GA	.	.	2	.	248	346	25	79	1	.	.	3	.	.	53	4
FT Benning, GA	.	.	2	1	188	288	53	82	1	.	.	.	1	.	86	76
FT Campbell, KY	2	.	1	.	539	503	92	67	.	.	.	.	1	.	68	33
FT Jackson, SC	.	.	.	.	166	224	28	40	.	.	1	.	.	.	6	.
FT Rucker, AL	.	.	.	.	21	62	9	8	.	1	.	.	.	.	.	10
FT Stewart, GA	3	3	.	4	261	646	104	171	4	2	15	18	1	1	39	96
WESTERN																
FT Lewis, WA	1	.	5	10	352	471	58	73	.	1	84	28	.	.	2	.
FT Irwin, CA	.	.	.	.	51	75	16	11	.	3	.	.	.	.	4	10
FT Wainwright, AK	.	.	1	17	115	119	10	14	1	.	.	.	18	28	.	.
OTHER LOCATIONS																
Hawaii	.	.	12	6	584	676	82	81	.	.	.	.	.	.	13	35
Europe	40	41	3	15	958	654	248	187	4	5	1	1	5	1	4	5
Korea	.	.	9	17	430	537	71	82	2	3	.	.	3	3	13	12
Total	**60**	**73**	**47**	**97**	**9,500**	**10,258**	**2,084**	**1,990**	**47**	**40**	**429**	**271**	**58**	**45**	**746**	**634**

[4] Primary and secondary

[5] Urethritis, non-gonococcal (NGU)

Note: Completeness and timeliness of reporting vary by facility

Source: Army Reportable Medical Events System

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U.S. Army Center for Health Promotion
and Preventive Medicine
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